

New Distributional Records for the Star-nosed Mole,
Condylura cristata (Insectivora: Talpidae), in
North Carolina, with Comments on its Occurrence
in the Piedmont Region

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ABSTRACT—The distribution of the star-nosed mole (*Condylura cristata*) in North Carolina is updated, including specimen-supported records for seven new counties and sight records for several additional counties. The species is locally common in the Mountains, spottily distributed throughout much of the Coastal Plain, and apparently rare to absent in much of the Piedmont. A specimen from just off the Blue Ridge escarpment in western Surry County represents the first Piedmont record supported by a specimen, although there are additional sight records and unverified reports from that region. This mole is sympatric with the state's other two mole species in many areas, but usually occurs in wetter habitats than either.

INTRODUCTION

The star-nosed mole (*Condylura cristata*) ranges from eastern Manitoba and Minnesota eastward to Labrador and Nova Scotia, and southeastward along the Atlantic coast to southeastern Georgia (Paradiso 1959, Burt and Grossenheider 1976, Petersen and Yates 1980, Hall 1981, Yates and Pedersen 1982). In North Carolina, its distribution has frequently been reported as consisting of two distinct populations—one in the Mountains, where the species is locally common, and one in the Coastal Plain, where it is uncommon to rare—with a conspicuous hiatus in the Piedmont (Lee et al. 1982, Webster et al. 1985, Lee 1987, Webster 1987). The scarcity of records from the Coastal Plain and complete absence of Piedmont records resulted in the species being recommended for listing as status Undetermined by the Nongame Advisory Committee to the North Carolina Wildlife Resources Commission (Webster 1987), and in 1990 the species was granted protection as a species of Special Concern under the North Carolina Endangered Species Act (G.S. 113-331 to 113-337).

I here report on the current known distribution of *Condylura cristata* in North Carolina by providing a list of existing records from the state, and a dot distribution map (Fig. 1) updated from maps provided by Lee et al. (1982) and Webster (1987).

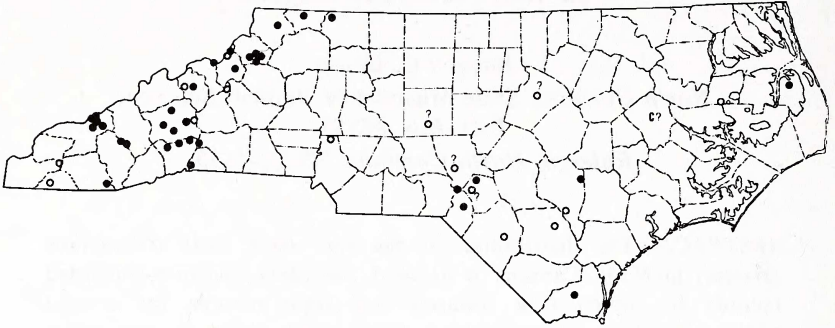


Fig. 1. Known distribution of *Condylura cristata* in North Carolina. Solid dots indicate localities documented by specimens in curated collections. Open circles indicate literature records or sight records not supported by specimens. A single dot or circle may represent two or more records in close proximity. A "C" indicates a literature record, not supported by a specimen, for which only the county and no further information was given. Question marks accompany records for which no specimen was observed, or which are unverifiable or otherwise questionable.

RECORDS OF OCCURRENCE

The following North Carolina localities are supported by voucher specimens, many of them in the North Carolina State Museum of Natural Sciences (NCSM), and are represented by solid dots on the distribution map:

Alleghany Co.: New River, "Sparta" (The New River is actually, at its nearest point, 4 mi. NW of Sparta), 30 May 1968, H. M. Tyus (NCSM 1762). *Ashe Co.*: "¾ mi. from jct. NC 16 and Friendship Church Rd." (= ca. 2 mi. ENE Jefferson), 4 Oct. 1991, E. Marsh (Appalachian State University 16731). *Avery Co.*: 2.6 mi. NNE Heaton, Pisgah National Forest, 27 May 1975, R. Jordan and J. Pentecost (Auburn University Museum 1-281); ¾ mi. SE Linville, 24 July 1984, D. S. Lee and J. P. Kumhyr (NCSM 4875). *Brunswick Co.*: ca. 6 mi. NNW Supply, Green Swamp Ecological Preserve off NC 211, "Moon Island." 16 May 1993, T. M. Padgett (TMP 511; to be deposited at NCSM). *Buncombe Co.*: W of Asheville (University of Michigan Museum of Zoology); Biltmore (Harvard Museum of Comparative Zoology 6635); ca. 2.6 mi. WNW Swannanoa, Warren Wilson College campus, Aug. 1977, D. S. Lee and B. Lee (NCSM 7837); Weaverville, 6 Feb. 1896, Mrs. J. S. Cairns (Harvard Museum of Comparative Zoology 5399). *Dare Co.*: ca. 7 mi. SW Manns Harbor, Alligator

River National Wildlife Refuge, Milltail Rd., 20 March 1991, P. R. Trail, M. L. Dunn, et al. (NCSM 6710). *Haywood Co.*: 5 mi. SW Waynesville on U.S. 23, 30 Aug. 1951, F. S. Barkalow, Jr. (North Carolina State University 274). *Henderson Co.*: Hoopers Creek near Fletcher, 8 Oct. 1974, B. A. Sanders (NCSM 4937); 1 mi. S Gerton, Little Bearwallow Mtn., 8 July 1994, P. B. Spivey (to be deposited at NCSM); 1 mi. W. NW Mills River (town), near jct. SR 1336 and SR 1338, 25 May 1993, K. A. Buhlmann, D. W. Herman, and J. L. Warner (NCSM 7868). *Hoke Co.*: 9.2 mi. NE Ashley Heights, Ft. Bragg Military Reservation, 29 May 1992, LCTA survey crew (NCSM 7213). *Jackson Co.*: 0.7 mi. NE Balsam, Blue Ridge Parkway at Balsam Gap, 22 May 1991, A. C. Boynton (NCSM 7528). *Macon Co.*: Highlands, 1 June 1946 (University of Georgia Museum of Natural History 192); Highlands, ca. 1 June 1946, R. Bridges (NCSM 6575); ca. 0.5 mi. E center Highlands, Highlands Biological Station, 23 Oct. 1982, S. Morrison (University of Georgia Museum of Natural History 7595); 1 mi. E.NE Highlands, SR 1603, 0.3 rdmi. E jct. SR 1604, 20 Sept. 1984, A. L. Braswell and J. E. Cooper (NCSM 7462). *New Hanover Co.*: near Carolina Beach, 16 Nov. 1956, G. Tregembo (NCSM 3243). *Mitchell Co.*: Roan Mtn. (Wake Forest University); Roan Mtn. near Magnetic City, 15 March 1894 (U. S. National Museum 66300); Roan Mtn. near Magnetic City, 15 Aug. 1895 (U. S. National museum 91519). *Polk Co.*: Green River Valley near Saluda, 28 May 1974, G. G. Shaw and M. Bradley (NCSM 1237). *Rutherford Co.*: Chimney Rock, Southside Drive, 19 Dec. 1989, M. Jaeger-Gale (NCSM 6336). *Richmond Co.*: 3.7 mi. NE Hoffman, U.S. 1, 0.1 rdmi. S Lumber River, 18 May 1980, A. L. Braswell (NCSM 3283). *Sampson Co.*: 5.5 km W Faison (Duplin Co.) off SR 1734, 9 June 1994, W. D. Webster (University of North Carolina at Wilmington 3370). *Scotland Co.*: "Laurinburg, Mr. Newton's farm" [the farm referred to was located ca. 8 mi. N Laurinburg, or 4.5 mi. W Wagram (NCSM files, W. M. Palmer, pers. comm.)], 12 April 1975, R. B. Julian (NCSM 3047). *Surry Co.*: 0.8 mi. NNW Low Gap near jct. NC 89 and SR 1433, A. B. Somers et al., 7 June 1994 (NCSM 7744). *Swain Co.*: Deep Creek; Kephart Prong Hatchery; Smokemont; Charlies Bunion Mtn. at Sevier Co., TN line; and Appalachian Trail between Newfound Gap and Indian Gap at Sevier Co., TN line; all in Great Smoky Mountains National Park (Great Smoky Mountains National Park collection, Linzey and Linzey 1968); Great Smoky Mountains National Park, Appalachian Trail, ¼ mi. S Boulevard Trail (= ca. 6.8 mi. NW Smokemont), 20 Aug. 1961, J. B. Westbrook (University of Georgia Museum of Natural History 3112). *Watauga Co.*: Blowing

Rock (Wake Forest University); Boone (Appalachian State University 7606); Boone, Hidden Valley Circle, 14 March 1981, D. Notrichia (Appalachian State University 7591); Boone, 1987, R. W. Van Devender (Appalachian State University 14633); ca. 1 mi. WSW Boone, jct. NC 105 and Poplar Grove Rd., 16 Sept. 1978 (Appalachian State University 5125); ca. 3 mi. WSW Boone, Laurel Cr. along NC 105, 13 Sept. 1985, F. Authenreith (Appalachian State University 12086); Blue Ridge TWP, Jakes Mtn. Rd. near jct. SR 1511, Dec. 1986, M. P. Rowe (Appalachian State University 12786); Blue Ridge TWP, SR 1511 along Sand Spit Branch and Blue Ridge Parkway, 27 Sept. 1987, R. W. Van Devender (Appalachian State University 14205); Sugar Grove, jct. U.S. 321 and Edmiston Rd., 24 Nov. 1978, H. Rogers (Appalachian State University 7601); Sugar Grove, Edmiston Rd., 5 Sept. 1985, R. N. Henson (Appalachian State University 12485); Watauga Co., no further data (Appalachian State University 16751). *Yancey Co.*: Burnsville, 3 Feb. 1976, L. P. Hartis (NCSM 2409).

In addition to localities supported by voucher specimens, the following literature and sight records are considered valid, and most are included as open circles on the distribution map:

"Mountains near the border of South Carolina" (Audubon and Bachman 1851). *Avery Co.*: Elk Park (Lee 1987, NCSM files). *Bladen Co.*: ca. 2 mi. N.NE White Lake (town) off SR 1517 near jct. U.S. 701, 30 April 1992, T. M. Padgett and R. Rageot (Thomas M. Padgett, pers. comm.). *Buncombe Co.*: 2–3 mi. N Black Mountain at Montreat, ca. 1915–1920, E. E. Brown (Elmer E. Brown, pers. comm.); Swannanoa, ca. 20 April 1931, C. S. Clapp (Lee 1987, NCSM files). *Cherokee Co.*: Topton, 13 May 1934, E. B. King (Brimley 1944–1946). *Clay Co.*: Hayesville, 3 Aug. 1947, R. G. Vick (Paradiso 1959, NCSM files; specimen formerly at NCSM but apparently lost). *Macon Co.*: Highlands vicinity, specimens "not infrequently" taken by H. C. Harbison prior to May 1908 (Brimley 1944–1946); Highlands vicinity, three specimens reported by Johnston (1967); one of these, formerly in the Highlands Museum, is now NCSM 6575; the same specimen was also reported by Odum (1949). *McDowell Co.*: just N Ashford along U.S. 221, ca. 1800' elev., two specimens taken from the stomach of a black rat snake (*Elaphe obsoleta*), 23 May 1960, E. E. Brown. These specimens were reported by Brown (1979), but their specific locality was not included in that paper (Elmer E. Brown, pers. comm.). *Mecklenburg Co.*: Davidson (east side near golf course branch), ca. 1950–1955, E. E. Brown (Elmer E. Brown, pers. comm.). *New Hanover Co.*: near Carolina Beach, 7 June 1959, G. Tregembo (Lee 1987, NCSM files). *Pitt Co.*: no further data (Lee et al. 1982, Clark et al. 1985, Lee 1987,

Webster 1987). The original source of this record seems uncertain, and it is accompanied by a question mark on the distribution map in Fig. 1. *Robeson Co.*: near Lumberton, early Dec. 1943, A. M. Ivey (Brimley 1944–1946). *Sampson Co.*: near Garland, 13 May 1918, J. F. Johnson (Brimley 1923, Brimley 1944–1946, Paradiso 1959). *Washington Co.*: Wenona, early Nov. 1992, E. R. Rainey (Brimley 1923, Brimley 1944–1946, Paradiso 1959). *Watauga Co.*: Boone, four specimens, 19 May 1918, (Brimley 1944–1946). *Yancey Co.*: ca. 7 mi. W. Burnsville along Lickskillet Branch, ca. 1981. J. McFee (Allen C. Boynton, pers. comm.).

Lee (1987) and Webster (1987) reported *C. cristata* from Moyock in Currituck County, based on a specimen from the digestive tract of a mink obtained from a fur dealer in that town and reported by Wilson (1954). However, Wilson (1954) indicated that some of the mink in his study were taken in Camden and Dare counties, and no specific locality was given for the specimen from which the mole was retrieved. That it was from Currituck County is possibly an erroneous assumption. It is therefore accompanied by a question mark on the distribution map. Regardless, this record affirms the presence of *Condylura* in the northeastern corner of the state.

Clark et al. (1985) suggested the occurrence of *Condylura* in Bladen and Hoke counties (no specific localities given) based on the presence of mole runs “almost certainly made by this species.” Lee (1987) reported *C. cristata* from McCain, Hoke County, citing Clark et al. (1985) as the source. That paper does not, however, contain a clear reference to the species’ occurrence at McCain. Lee (1987) further reported observation of “burrows and mounds of *Condylura*” from West End, Moore County, in 1980. Since these records did not involve the observation of actual specimens, they are accompanied by question marks on the distribution map.

Lee (1987) also reported *C. cristata* from Green [sic] County, “pre-1950,” citing Clark et al. (1985) as the source, but that paper contains no reference to the species occurring in Greene County. Neither are there records from that county in the North Carolina State Museum’s files, hence, it is not included on the distribution map.

Two additional reports of *C. cristata* from the Piedmont of North Carolina are as follows.

Randolph Co.: 2.1 mi. SSE Ulah, off SR 2843 < 0.1 rdmi. SE jct. NC 159. John Schneider, a horticulturist with the North Carolina Zoological Park, reported (personal communication) a specimen that was captured and badly mangled by his dog in March or April, 1991. I visited the site in July, 1994, and found no obvious signs of fresh

mole activity, but no serious collecting efforts have yet been undertaken there.

Wake Co.: 1.25 mi. SW Millbrook (= 4.0 mi. N.NE center Raleigh), 4001 Quail Hollow Drive along Big Branch. Dr. Wesley E. Kloos, a genetics professor at North Carolina State University, reported (personal communication, NCSM files) having captured two specimens in his back yard between 1989 and 1991, and released both in nearby Eastgate City Park. A photograph sent to the North Carolina State Museum, of Kloos holding one of the captured animals, was too small and blurred for positive identification. Frequent pitfall trapping on the site during 1992–1993 yielded no specimens.

Although neither Kloos nor Schneider is a mammalogist, both are scientifically oriented individuals, and each seemed certain of the animals's identity. The star-nosed mole is certainly a difficult animal to misidentify. Their reports are therefore included here, and are probably valid, although they remain unverified, and are accompanied by question marks on the distribution map. Except for the Surry County record, and the Mecklenburg County sight record by Brown, they represent the only reports from the Piedmont region of the state. However, the records from Polk and Rutherford counties (NCSM 1237 and 6336, respectively) are very near the eastern edge of the escarpment, and the sight record of burrows and mounds from West End in Moore County (Lee 1987) is at the extreme inner edge of the Coastal Plain.

The locality for the Surry County specimen (NCSM 7744) lies just off the Blue Ridge escarpment in the extreme western Piedmont, and is the first specimen-supported record for that geographic province in the state. The specimen was found dead along a bog at the edge of a hayfield. Evidence of considerable mole activity was apparent at this site during 1994 and 1995 (personal observation), and the landowners reported that these moles were commonly killed by house cats on the property, as was possibly the case with this specimen (Ann B. Somers, personal communication).

The specimens from Ashe, Brunswick, Dare, Hoke, Jackson, and Rutherford counties also represent new county records. The sight records for Bladen, McDowell, Mecklenburg, Randolph, and Wake counties, though not supported by specimens, represent previously unpublished county records as well (see Lee et al. 1982, Webster 1987).

DISCUSSION

The range of the star-nosed mole overlaps that of the eastern mole (*Scalopus aquaticus*) throughout North Carolina, and that of the hairy-tailed mole (*Parascalops breweri*) in the Mountains. The hairy-

tailed mole is currently known from Avery, Buncombe, Caldwell, Jackson, Haywood, Macon, Mitchell, Swain, Transylvania, Watauga, Wilkes, and Yancey counties in the Mountains (Lee et al. 1982, NCSM files). The late Joseph M. Bauman (personal communication) also reported specimens from Cherokee County. The eastern mole apparently occurs throughout the state (Lee et al. 1982, Webster et al, 1985), and is in most places the most common mole.

Differences in habitat preference by the three have been noted by several authors. Star-nosed moles are known to prefer, if not require, wet areas as habitat (Hamilton 1931, Burt and Grossenheider 1976, Yates and Pedersen 1982, Webster et al. 1985). Nearly all North Carolina specimens for which habitat information is available were collected in such areas. A possible exception is the Bladen County specimen listed above, which was found dead in a dry, sandy area apparently not near a wetland (T. M. Padgett, personal communication). The eastern mole has been reported to avoid "the wet soils preferred by the Star-nosed Mole" (Lee et al. 1982). The hairy-tailed mole reportedly occurs in similar habitats as the eastern mole, but usually at higher elevations, with most specimens being taken at above 2,000 ft. (610 m) (Lee et al. 1982, Webster et al. 1985, NCSM files). Lee et al. (1982) reported the hairy-tailed mole to be "considerably more common than the Star-nosed Mole," but this may not hold true at all montane localities. In Watauga County, for instance, *Condylura* apparently is more frequently encountered than *Parascalops* (R. W. Van Devender, personal communication), and there are overall more *Condylura* than *Parascalops* from the North Carolina mountains in the State Museum's collections.

The ecological niches of the three moles may thus be loosely described as *Parascalops* and *Scalopus* frequenting well-drained soils, often with an altitudinal separation between them, and *Condylura* utilizing wet, low-lying areas at a wide range of elevations. However, some syntopy may occur. All three species may occur at some montane localities, as is the case in the vicinity of Highlands Biological Station in Macon County at ca. 3,900 ft. (1,190 m) in elevation (NCSM files). In Ashe County at ca. 2,880 ft. (878 m), I found a dead eastern mole (NCSM 7251) in a wet sedge meadow bog, a site which appeared more suitable for a star-nosed mole. Eadie (1939) reported having trapped *Condylura* and *Parascalops* in the same tunnel at a New Hampshire site. Undoubtedly, the distributions and interspecific relationships of North Carolina's three mole species merit further study.

The possibility that *Condylura cristata* occurs at low densities or at scattered localities throughout the state, and that the Mountain

and Coastal Plain populations are not disjunct, should not be ignored. Although Lee et al. (1982) stated that "absence of records from the piedmont is certainly not an artifact of collecting," there have probably been few serious efforts to collect *C. cristata* in the North Carolina Piedmont, other than the recent trapping efforts at the Wake County site. Moreover, specific attempts to collect *Condylura* in the Mountains and Coastal Plain have seldom if ever proven successful, and Clark et al. (1985) commented on the difficulty encountered in trapping the species. Most available specimens for which the method of collection is known were found dead on roads or otherwise accidentally encountered. Even in the Mountains where the species may be fairly common, there are still several counties for which specimens have not been reported. Much of the Piedmont, particularly the western part, has been largely overlooked or ignored by biologists, and its fauna remains poorly documented. Small, fossorial or otherwise secretive vertebrates may long elude detection in any region. As examples, the eastern tiger salamander (*Ambystoma tigrinum*) was first discovered in the Piedmont in Wake County by me in 1982 (NCSM files) after that area had been heavily collected by herpetologists for nearly a century; and the bog turtle (*Clemmys muhlenbergii*) was discovered in three new Piedmont counties during 1992–1993 (Beane 1993). Although some areas, such as the Raleigh vicinity, have been heavily collected by mammalogists and other biologists for more than a century, little effort has been specifically aimed at star-nosed mole trapping.

The North Carolina Piedmont has been heavily altered for agriculture and urbanization—probably more so overall than either the Mountains or the Coastal Plain, and many Piedmont wetlands have been drained or otherwise destroyed in the process. It is possible that wetlands alteration or other human activities may have eliminated the star-nosed mole from many areas of the Piedmont in recent times. If populations of this mole do occur throughout the Piedmont of North Carolina, it is likely that they exist as scattered relicts (either Pleistocene relicts or more recent anthropogenic relicts) and at low densities. It is hoped that this paper will help stimulate biologists working in North Carolina (and other southern states) to make every reasonable effort to collect evidence of *Condylura*, and to photograph or collect specimens wherever they are encountered, especially at undocumented localities.

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